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## ORIGINAL ARTICLE



# Developing visual tangible artefacts as an inclusive method for exploring digital activities with young people with learning disabilities

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## Abstract

**Background:** Young people with learning disabilities use many digital technologies to undertake meaningful and social activities in their everyday lives. Understanding these digital activities is essential for supporting their digital participation. Including them in exploring their digital activities can be challenging with conventional qualitative research methods, because digital activities are a complex and abstract topic to discuss, particularly for people with learning disabilities. In this paper, we present the rationale for developing and using visual tangible artefacts (VTAs) to include young people with learning disabilities in exploring their digital activities.

**Methods:** We devised a suite of VTAs to engage young people (aged 14–27 years) with learning disabilities in exploring their digital activities via interviews, diaries, and workshops. The VTAs comprised Talking Mats (TMs), probing with technology, digital snapshots and inspiration cards.

**Findings:** Our significant methodological findings were that VTAs are useful for exploring digital activities with young people with learning disabilities. TMs and probing with technology can engage participants to map, recall and explain their digital activities. Digital snapshots are valuable for validating findings with participants, and inspiration cards aid perspectives about digital aims. Although communication and abstract representations can be challenging for people with learning disabilities, VTAs that combine familiar, simple, intuitive, individualised, rewarding elements and collaboration with participants proved valuable for exploring their digital activities.

**Conclusion:** We concluded that VTAs are inclusive tools for exploring the digital activities of and with young people with learning disabilities. The VTAs allowed access to conversations, information and insights that are not obtainable otherwise. As such, the VTAs may be regarded as a new model for inclusive research in the field of disability and technology studies.

## KEYWORDS

communication, inclusion, learning disability, participation, visual tangible artefacts, young people

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### Accessible summary

- Digital technologies are widely used by young people with learning disabilities to talk to their friends and family, meet new friends and entertain themselves.
- These digital activities are complex and can be difficult to talk about.
- We developed methods to support conversations about digital activities with young people with learning disabilities.
- The paper gives examples of how the methods are used, why they are necessary and how they promote discussion of digital activities.

## 1 | BACKGROUND

Today, we consider digital accessibility a human right (United Nations, 2006), and in our study, we have explored digital activities and participation in digital communities among young people with learning disabilities (Andreasen & Kanstrup, 2019; Weber & Kanstrup, 2022). This phenomenon is essential to understand because 'digital technology' constitutes a big part of their lives, and because of the opportunities that digital activities can offer this target group. Among other benefits, digital technology gives users the ability to form and maintain meaningful relationships, voice their opinions and entertain themselves (Andreasen & Kanstrup, 2019; Bayor, Bircanin, et al., 2019; Buchholz et al., 2018; Caton & Chapman, 2016; Löfgren-Mårtenson, 2008; Ringland et al., 2016; Söderström, 2009). However, accessing insights about digital activities can be challenging, due to the target group's inherent communication challenges. These are usually related to literal interpretation, low levels of reflection and comprehension, concentration issues, overstimulation, anxiety and high imagination (Andreasen & Kanstrup, 2019; Benton et al., 2014; DeMuro et al., 2012; Hendriks et al., 2015). They bring these communication challenges into their digital activities; therefore, many experience digital challenges regarding usability, accessibility, cyberbullying and exclusion because they are unable to navigate and understand digital norms and language (Alfredsson Ågren et al., 2020; Bayor, Sitbon, et al., 2019; Chiner et al., 2017; Seale & Chadwick, 2017). This complexity makes digital activities abstract to discuss, which makes it challenging for researchers and caregivers alike to understand and support their digital activities (Weber & Kanstrup, 2021). With the above in mind, there is a need to carefully consider the methods used to explore and map the target group's digital activities. In collaboration with the participants, the ambition of our research is to create inclusive methods that can support collecting, validating, communicating and stimulating insights about digital activities.

### 1.1 | Including young people with learning disabilities in the exploration of their digital activities

The risk of misrepresenting people with learning disabilities in qualitative research is a major concern. Studies indicate that this target group is often treated as passive users in research. Their voices are usually presented by

proxies (family members or caregivers), and they are often used to test assistive technologies rather than to participate in the design process (Benton & Johnson, 2015; Brereton et al., 2015; Seale & Chadwick, 2017). Inclusive methods that facilitate the users' engagement in collecting and validating research can counteract misrepresentation (i.e., techniques that support users' communication) (Brandt et al., 2012). Disability studies use inclusive, participatory and emancipatory research approaches; these are similar, with minor differences, in their approach and conceptual understandings. Common principles of these approaches include the idea that the research should benefit people with learning disabilities, empower and emancipate them, present their views and give voice and agency to participants (Chappell, 2000; Nind & Vinha, 2014). Inclusive research should include participants in the research process as coresearchers, where keywords are collaboration, mutual learning, knowledge sharing, negotiation (Burke et al., 2003; Flood et al., 2013; Nind & Vinha, 2014) and support (Keyes & Brandon, 2011; Seale et al., 2018). A collaboration among people with and without learning disabilities may mean collaborative data collection (Schwartz & Durkin, 2020), coanalysing (Nind & Vinha, 2014) and/or codissemination (Riches & O'Brien, 2020). Fulfilling these standards can be challenging, and the researchers and participants must cooperatively create a democratic 'third' research space (Nind & Vinha, 2014; Seale et al., 2015). In participatory design, learning support and agency are similarly emphasised for research with the target group, as are accessibility and usability (Bayor, Sitbon, et al., 2019; Seale et al., 2018).

To this end, there is no unique understanding of inclusion, participation or emancipation in disabilities studies, and the research recommends a flexible conceptual understanding and creative research approach (Hendriks et al., 2015; Nind & Vinha, 2014; Seale et al., 2015). Therefore, we view inclusion as a continuum that can be scaled differently depending on the individual's ability, preferences and context. In this paper, we use the term 'inclusion' in an effort to be consistent (Seale et al., 2015).

#### 1.1.1 | Visual tangible artefacts (VTAs)

The target group, including our participants, usually relies on nonverbal communication, simple language, slow tempos and familiarisation to accommodate individual triggers and needs (Andreasen & Kanstrup,

2019; Benton et al., 2014; DeMuro et al., 2012). For this reason, finding ways to engage participants in conversations about their digital activities to analyse and understand this phenomenon is a challenge when using conventional data collection methods. VTAs are a concept and toolkit that can facilitate participation, reflection, conversation and cooperation and stimulate memory and imagination (Kanstrup & Bertelsen, 2011). They allow users to manipulate materials and emphasise visual presentation (the use of colours, photos and graphics) (Kanstrup & Bertelsen, 2011), which is essential for supporting verbal communication with the target group (Baykal et al., 2020; Cameron & Murphy, 2006; Cluley, 2016; Hendriks et al., 2015). Tangible presentation is another crucial element of VTAs to support communication with the target group about the abstract phenomenon of digital activities (Baykal et al., 2020; Kanstrup & Bertelsen, 2011). 'Tangible' often refers to something being concrete, understandable and having a physical shape to display digital information (Ishii & Ullmer, 1997; Kanstrup & Bertelsen, 2011). Like other researchers exploring artefact ecologies, we were occupied with visual mapping techniques to retrieve and present a comprehensive list of artefacts with which people interact (Bødker et al., 2017).

## 1.2 | Research aims

This paper explores how to develop and use VTAs as an inclusive communication method for young people with learning disabilities to explore their digital activities. Notably, we explore how these methods are beneficial for mapping, validating and inspiring insights about digital activities. The VTAs enhance the current model and concept of VTAs and inclusive research with guidelines for developing and using VTAs in the field of disability and technology studies.

## 2 | METHODS

### 2.1 | Participants and data collection methods

The study population comprises 25 participants aged 14–27 years. All participants have one or multiple learning disabilities, including autism, attention deficit hyperactivity disorder, Down syndrome and psychological and/or physical disabilities. All participants have verbal abilities. We conducted the study in Denmark and recruited participants from three institutions for young people with special needs: a primary school, a youth education centre and a group home. United Nations Youth defines 'young' as the 15–32 age group (United Nations Youth, 2014). We justify the categorisation of our participants as 'young people' based on this definition, although the age range is broad and the participants from the group home are young adults. We included 8–9 participants from each institution. Gender was mixed, except among the primary school-aged participants, as only males participated in the study. Demographic information is illustrated in Table 1. There were no dropouts, and we included all participants in each research step.

Table 1 presents the study participants' characteristics concerning an institution, number, age and gender.

**TABLE 1** Study participants

Institution	Number	Ages (years)	Gender
Primary school	8	14–17	Male
Youth education centre	8	18–22	Mixed
Group home	9	23–27	Mixed

We collected data about participants' digital activities following a flexible and creative approach and the principles for inclusive research mentioned in the background section of this paper (Nind & Vinha, 2014). We used the following main participatory design activities: fieldwork (informal interviews and diaries), workshops and evaluations (Bødker et al., 2022). All activities were audio- and video-recorded, to allow in-depth visual and verbal data analyses (Ylirisku & Buur, 2007). Three participants declined to be filmed, but approved being audio-recorded, which was available for all participants.

To familiarise herself with the participants and the study environment, the first author conducted a pilot visit (one full day) to all three institutions; during these visits, she engaged in initial conversations with participants and caregivers and followed their daily routines. Afterwards, she conducted semistructured interviews during a 1-week fieldwork period at each institution, working with individuals or teams of 2–3 participants. Interviews lasted between 20 and 60 min. Participants made video diary entries every day for 1 week, working with caregivers and the first author, to understand participants' everyday use of and experiences with digital technology and give participants a chance to elaborate on sensitive matters. Video diary entries lasted 5–15 min and were structured around three questions: (1) What did you do on your device today? (2) Have you done something interesting or fun with others online today? and (3) Have you experienced any challenges with others online today? Workshops (one at each institution) were hosted 3 months after the interviews and diaries, to validate and discuss findings with participants. In the first part of the workshop, we discussed participants' digital activities, while in the second part, we discussed their aims for digital activities, inspired by 'future workshops' (Brandt et al., 2012). The workshops lasted 3 h, with participants in groups of 3–4 and a familiar researcher and caregiver present.

We transcribed and analysed our data thematically (Braun & Clarke, 2006) using the video analysis software Transana (Transana, Professional 3.32).

### 2.2 | Ethical perspectives

The research project was approved by the Danish Data Protection Agency under the administration of the Office for Grants and Contracts at Aalborg University (registration number: 2018-899/10-0192). Researchers informed the participants about the study at a meeting, and those who were interested approached the researchers or caregivers and gave their verbal and written consent to participate anonymously. As our participants have learning disabilities, ensuring that they understood and agreed to the informed consent form was imperative (Cameron &

### 3 | FINDINGS

Table 2 illustrates that all VTAs had visual and tangible characteristics and the purpose of supporting communication about digital activities.

### 3.1 | Talking Mats: Digital mapping

Step 1: Prepare the TM. Use option symbols related to the central topic (Stans et al., 2019), such as pictures of digital technologies (devices and applications) and relational aspects (e.g., friendship and loneliness). Print and laminate the option symbols. Make sure to bring blank items for the participants to manipulate.

Step 2: Mode-scale. Arrange the top of the mat with a mode scale using smiley faces; green for 'like', red for 'dislike', and yellow for 'indifferent'.

Step 5: Visual portrait. Take a picture of the rough, initial mapping of the participant's attitude towards their digital activities, the mat (cf. Figure 1).

We also used the mat during the workshops to categorise technologies and digital aims that the participants liked and shared, making it a familiar artefact. The different uses of the TMs are illustrated in Figures 1 and 2.

### 3.2 | Probing with technology to understand digital activities

The TMs were used during fieldwork together with a technique that we call 'probing with technology' during fieldwork. The approach 'Interview



**FIGURE 1** Talking Mat. This figure represents the option symbols (applications, devices and relations) used by a participant at the primary school. These are organised on the mat together with the participant's experiences with digital technologies and social relations (the green, yellow and red smiley faces). [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/etep.12345)]

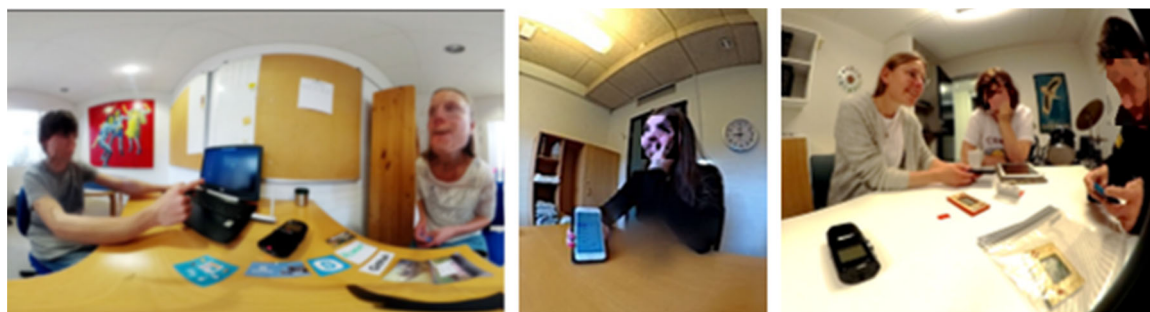
TABLE 2 Overview of VTAs

VTA	Research stage	Purpose	Characteristics	Role of participant	Role of researcher
Talking Mats	Fieldwork + workshop (Stages 1, 2 and 3)	Stimulate conversations and emotional responses to mapping digital activities	Familiar, manipulative, flexible and defined space	Expert	Trainee
Probing with technology	Fieldwork (Stage 1)	Stimulate memory and conversation to understand digital activities	Highly familiar and personal	Expert	Trainee
Digital snapshots	Workshop (Stage 2)	Stimulate memory, conversation and imagination, validate findings	Familiar (items), intuitive and gifts	Validator	Facilitator
Inspiration cards	Workshop (Stage 3)	Stimulate imagination about digital aims	Inspirational	Visionary	Facilitator





**FIGURE 2** Talking Mats. Figure 2 represents the TMs used during workshops. The left mat is divided into categories of 'technologies we like' and 'technologies we share' among participants. The right mat is divided into 'digital aims we like' and 'digital aims we share'. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/bd.12505)] See the Terms and Conditions (<https://onlinelibrary.wiley.com/terms-and-conditions>) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License



**FIGURE 3** Probing with technology. This figure illustrates examples of probing with technology. In Picture 1, a participant shows the first author a website he made by himself. In Picture 2, a participant uses the Screen Time app on her iPhone during video dairies to show the caregiver her technology use over the past 24 h. In Picture 3, we see the game night hosted at the group home where participants used old Nintendo Gameboys. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/bd.12505)] See the Terms and Conditions (<https://onlinelibrary.wiley.com/terms-and-conditions>) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

to the Double' inspired the technique (Nicolini, 2009). In this approach, participants show how they use their digital technologies to help the researcher understand their digital activities (Nicolini, 2009; Turner, 1999). This hands-on technique puts the user's technology under the lens using the following steps from our research:

Step 1: Identify the central digital technology. Identify devices and applications used by participants (e.g., TMs).

Step 2: Show and tell. Ask participants to show specific digital activities that they undertake on their devices. This could be done by using the Screen Time app on iPhones or Android devices, which can help participants recall and converse about their digital activities. The participants are asked to go into the Screen Time app and show how much time they spent on their applications. This makes the conversation about digital activities tangible for both the participant and the researcher, who can ask questions about the specific applications displayed in the list. A caregiver at the youth education centre initiated using the Screen Time app during the participants' video diary sessions.

Step 3: Expert role. Let the participants take the lead in what they want to show and tell to place them in an expert role (Wadel, 1991). Ask probing questions, even if they seem obvious, to learn from the participant by placing the researcher in a trainee role.

Step 4: Decide on a probing style. Probing can take many forms. Decide, for example, if there is a need for more interaction between the researcher and the participant. For example, playing a game with

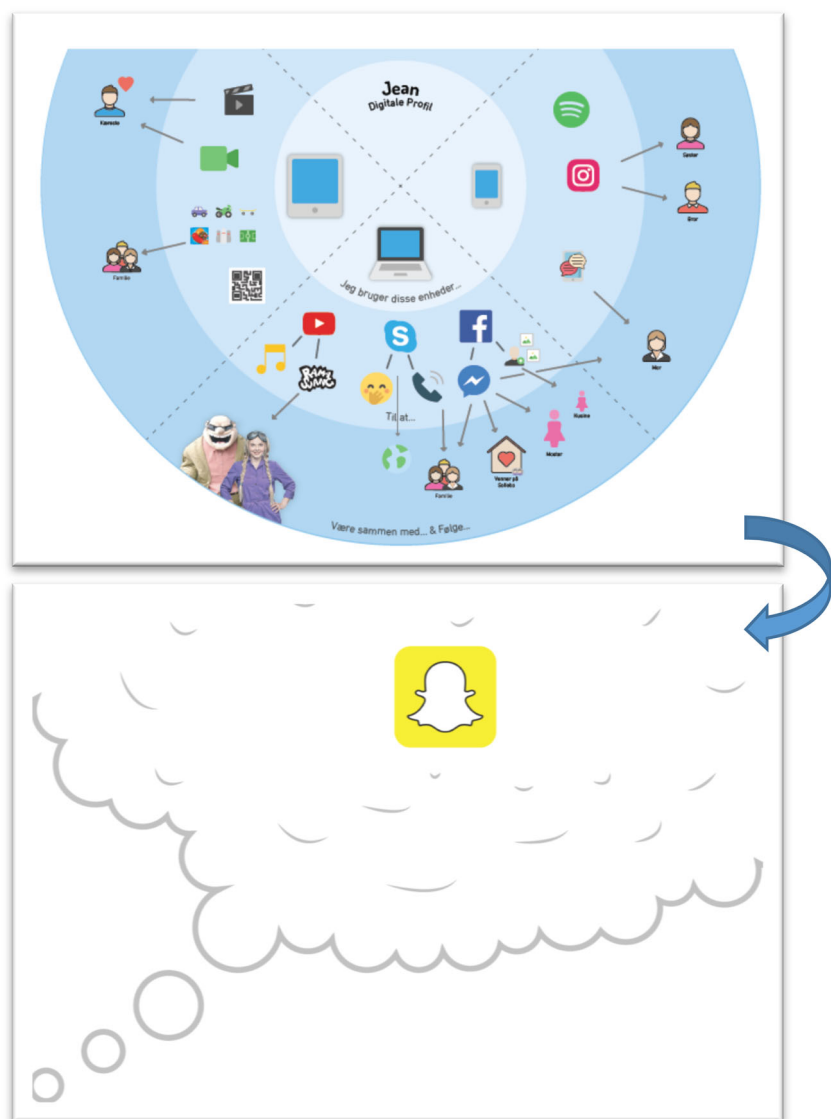
the participants can be beneficial to gain access to and understand their digital activities.

Step 5: Introduce unfamiliar technology to participants. This can be done to challenge and spur conversations about participants' digital activities. For example, a caregiver at the group home initiated a game night for the participants during fieldwork where they tried the first Nintendo Gameboys. Some played, others watched the games and others used their own devices. While the participants were using the Gameboys, conversations flowed around the unfamiliar technology, from laughing about the games to discussing how these worked compared to their currently used devices. Figure 3 illustrates examples of how to probe with technology.

### 3.3 | Digital snapshots: Validating and communicating digital activities

A digital snapshot is a detailed visual map and portrait of each participant's digital activities, presenting a glimpse into his or her digital life at a specific point in time. The technique was developed and used to support participants in sharing their digital activities and to validate our findings with participants. We based it on the following steps:

Step 1: Prepare the data. We used the initial mapping of participants' digital activities from the TMs, the probing with



**FIGURE 4** A digital snapshot. This figure presents the digital life of Jean in October 2019. Jean is 24 years old and lives in a group home. As shown in the inner sphere of her digital snapshot, Jean has a computer, an iPad and a phone. As visualised in the middle sphere, Jean uses a collection of applications on each device. As visualised in the outer sphere, she uses some applications for individual activities, but several of the applications are used to interact with her family, her boyfriend, friends at the group home and friends from work. As illustrated on the backside of Jean's digital snapshot, her digital aim is to use the Snapchat application, which she has been encouraged to use by her friends at the group home. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/bd.12505)]

technology technique and a thorough thematic analysis of the video and audio recordings to inform the digital snapshots.

Step2: Produce the digital snapshots. These were printed in A3 format and laminated. As visualised in Figure 4, the digital snapshot contains a simple structure representing each participant's three spheres. The front side contains:

- (1) An inner sphere, mapping the user's hardware devices
- (2) A middle sphere, mapping the user's applications
- (3) An outer sphere, mapping the user's digital relationships.

The colours indicate the borders of the digital spheres. The arrows from the middle to the outer sphere illustrate the process of using digital technology to interact with different people, and for different purposes, to simplify a complex process in the visual portrait.

A thought bubble was included on the back side of the digital snapshot, to visualise the participant's digital aims. The purpose of the thought bubble was to stimulate imagination among workshop

participants, as we noted during fieldwork this task was challenging for many of them. Consequently, most thought bubbles were left empty or contained scarce information.

Step 3: Validation. A critical vision for the digital snapshots was to validate our findings from the thematic analysis and initial mapping with participants, to ensure that the findings were consistent with participants' perceptions of their digital activities. In facilitating this validation process, it was essential to explain the digital snapshots thoroughly to participants during the workshop, to ensure they understood the snapshots' structure and purpose. The first author shared her own digital snapshot to exemplify and facilitate knowledge-sharing.

During the workshops, we discovered that digital snapshots are a visual way of depicting a person's digital activities at a specific point in time. All participants appreciated the digital snapshots, but were occupied with sharing whether or not they thought they had represented their digital activities well, and several participants highlighted that changes should be made. These changes were requested not because the initial maps were wrong, but because the participants' digital activities and aims



had changed. How they were presented in the digital snapshot was important to them, thus they wanted to make sure that we updated them. Figure 5 presents an example of the dynamic process of mapping digital activities with a participant. Here, we see a participant who changed her digital activities between the time of the interview and the workshops, events that took place approximately 3 months apart. Three months after the workshop, her digital activities had changed again, implying that this process would likely continue.

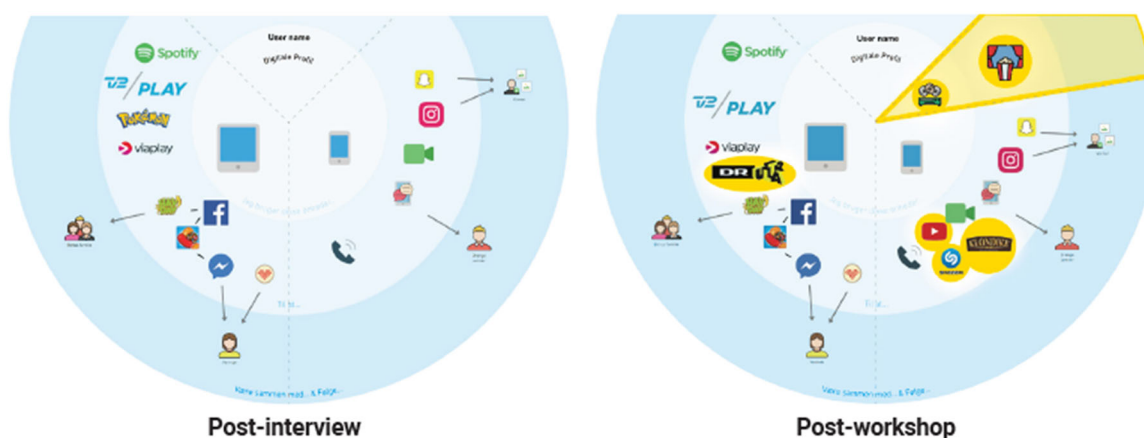
Step 4: Inspiration and collaborative learning. During the workshop, we used digital snapshots to identify and compare which devices and applications the participants shared, and which were different, to facilitate collaborative learning, inspiration and recognition among participants.

Step 5: Give something back to participants. We gave each participant their individually developed digital snapshots to keep. The

idea was that the digital snapshots served as a gift to participants for sharing their thoughts and participating in the research. We learned that the participants value this attention to the principle of give and take. Additionally, the digital snapshots functioned as a way for the participants to communicate their rich digital activities to family and friends.

### 3.4 | Inspiration cards for digital aims

Digital aims were challenging for participants to discuss during the workshop when solely using the thought bubbles on the back sides of their digital snapshots. Therefore, we developed laminated cards, which we named 'inspiration cards'. The cards contained a mix of digital activities that all study participants engage in, as exemplified in Figure 6.



**FIGURE 5** Dynamic nature of digital activities. This figure illustrates a participant's dynamic digital activities. Icons that changed from the time of the interview (left) to the time of the workshop (right) are highlighted; the participant stopped using Pokémon Go and was using Snapchat less, started playing Klondike and using Shazam and used YouTube more than previously. She also wanted a DVD player added to the digital snapshot, as she watches numerous movies. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/bd.12505)]



**FIGURE 6** Inspiration cards. This figure illustrates examples of inspiration cards with digital activities conducted by participants across institutions. These were: (1) Develop new friendships online (top left), (2) game with friends around the world (top right), (3) 'Like' comments or a picture on, for example, Facebook (bottom left) and (4) share content online (bottom right). [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/bd.12505)]

The inspiration cards were used in combination with the thought bubble, with the hope of inspiring and inviting ambiguous and reflected responses from the participants concerning their digital aims. We used the following steps to develop and use the inspiration cards:

**Step1:** Develop inspiration cards. Identify participants' emerging digital activities from a thorough thematic analysis and write these on a card with associated icons illustrating the activity.

**Step2:** Use inspiration cards. Place the digital snapshots face down in front of each participant and address the items in the thought bubble (if there are any). Take one inspiration card at a time and ask the participant whether they want to improve, want more of or wish something were different regarding the card at hand. During workshop conversations focused on the future, we wanted participants to provide critiques and utopian visions regarding their digital activities; therefore, they were asked not to think about the plausibility of their proposals (Brandt et al., 2012). For example, one participant expressed the aim of playing a specific game online (Team Fortress 2) with his friends at the group home. They are currently not able to game together online, but at the workshop, the friends discussed and agreed that this was a digital aim they all shared.

**Step3:** Create a visual portrait. Place the cards in a structured space, for example, on TMs (cf. Figure 2). Take a picture at the end of the exercise.

## 4 | DISCUSSION

This study sought to explore how we can develop and use VTAs as an inclusive communication method to explore digital activities with people with learning disabilities. Based on our study findings, we clarified that we need to develop bespoke techniques for researchers and participants to meet in conversation about digital activities. The VTAs—TMs, probing with technology, digital snapshots and inspiration cards—are valuable and inclusive communication tools for mapping, validating and inspiring information about digital activities with young people with learning disabilities. As such, the VTAs contribute to a new model of inclusive research in the field of disability and technology studies.

### 4.1 | Methodological strengths and limitations: How are the visual tangible artefacts inclusive?

The VTAs served their purpose to aid in the exploration of digital activities with the target group, thus we need to consider their inclusiveness. Previous studies have addressed the difficulty of using traditional qualitative research methods, such as contextual interviews, direct observation of technology use and workshops with people with learning disabilities (Bayer, Bircanin, et al., 2019; Bayer, Ploderer, et al., 2019; Bayer, Sitbon, et al., 2019; Brereton et al., 2015; Rajapakse et al., 2019). We argue that it is possible to use traditional qualitative research methods to explore and understand the target groups' digital activities

by using the VTAs presented in this study, thus making it possible to include the target group directly, rather than by proxy (Benton & Johnson, 2015; Brereton et al., 2015; Seale & Chadwick, 2017). Similar to cultural probes, we transformed what would have been question guides into VTAs, to invite ambiguous and reflected responses from the participants (Gaver et al., 1999; Stans et al., 2019). We learned from using the VTAs that it is vital to use artefacts that are familiar to participants and to use a simple, intuitive and visual design to meet the participants' needs for visual and tangible communication, as suggested in participatory design research with the target group (Bayer, Ploderer, et al., 2019; Rajapakse et al., 2019; Seale et al., 2018), such as using limited text, recognisable icons and individualising the visual artefacts. In addition, we learned from participatory design research that it was essential to give something back to participants (Kanstrup & Bertelsen, 2011). Receiving a gift and something to be proud of (the digital snapshots) motivated the participants to use the artefacts as a tool for self-expression (Bayer, Sitbon, et al., 2019). In this sense, their voices were amplified and heard (Nind & Vinha, 2014; Seale et al., 2018), which may have empowered and emancipated them by creating awareness of their digital activities and abilities. Using digital snapshots to validate findings with participants was our way of ensuring a fair presentation of their views, which is essential in inclusive research (Nind & Vinha, 2014). Lastly, we learned that VTAs can facilitate collaborative learning, inspiration and recognition among participants (Bayer, Sitbon, et al., 2019); for example, the inspiration cards facilitated a joint conversation and an agreement about digital aims among participants. The collaboration between participants and the researcher, and among the participants, was essential, as is emphasised in inclusive research (Nind & Vinha, 2014). The participants did not function as coresearchers (Flood et al., 2013), but the collaboration was evident in knowledge-sharing and mutual learning (Burke et al., 2003; Flood et al., 2013; Nind & Vinha, 2014). For example, we encouraged participants to take an expert role in sharing their digital activities, particularly when probing with technology and using TMs (cf. Table 2). Furthermore, the first author shared anecdotal knowledge from her personal digital activities during fieldwork and workshops and showed participants how to use applications that were new to them. The collaboration was also apparent in the flexibility and negotiation of terms during data collection, which fit the participants' needs and preferences. Thus, when conducting research with lonely people, it is vital to consider the researchers' role (Booth, 1998; Walmsley, 2004). The first author occasionally found herself in a position where she took the role of a psychiatrist or friend, which was not the intention of this study.

Concluding, using VTAs fosters inclusiveness, but they should not stand alone. They should be used together and in combination with a thorough data analysis, as also suggested when using cultural probes (Gaver et al., 1999). We opted to adhere to continuing conversations (Gaver et al., 1999) and design as an iterative process (Brereton et al., 2015), due to participants' inherent dynamic nature in digital activities. In addition, we chose to take a gradual, flexible and creative approach to data collection, which allowed for individual abilities and preferences to be taken into consideration (Hendriks et al., 2015; Nind & Vinha, 2014; Seale et al., 2015).

## 4.2 | Implications for using visual tangible artefacts and expanding inclusion

The chief implication of our study and the VTAs is that we explore this option for using VTAs in practice. The collaborating institutions in the study and other stakeholders working with the target group have also demonstrated interest in using the VTAs to explore digital activities with the target group, and potentially with regard to more sensitive topics related to digital challenges (Weber & Kanstrup, 2022).

Second, we have explored the options for expanding inclusiveness and hope to inspire researchers to extend the repertoire of VTAs for exploring digital activities among the target group, based on our experiences of developing and using VTAs. For example, current participatory design research focused on visual support with this target group has inspired ways for mainly digital snapshots to be more inclusive. Using an application (CanVis) as part of a reflective agile iterative design approach to support communication and goal-setting for the target group (Wilson et al., 2016) could have enabled a more direct inclusion of participants in the process of mapping and editing the digital snapshots. We could have used the method by placing an empty digital snapshot in the CanVis application and all icons used by participants, thus enabling them to select and place the applications and relationships on the digital snapshots themselves, or to edit the visual portrait presented at the workshop. Staff at the group home recently requested and received an empty template of the digital snapshot to use for this purpose, after the idea was presented to them at a workshop. In addition, some details could be visualised in the visual portraits, such as use frequency and conflicts in interactions.

Our tools and techniques could also be further developed to include participants in collecting material for the research project, similar to how users collect materials for cultural probes (Gaver et al., 1999). This would increase their autonomy in the data collection process. Participants could take pictures of their digital activities to prepare for interviews, map their digital activities and contribute with illustrations for their digital portraits.

## 5 | CONCLUSION

The key message of our study is that VTAs can aid the inclusion of young people with learning disabilities in explorations of their digital activities, thereby presenting a new model for inclusive research. TMs and probing with technology can be used to map and understand digital activities with the target group. Digital snapshots help to validate and communicate the participants' active and dynamic digital activities, and inspiration cards aid reflection on digital aims. The VTAs serve different purposes, but common characteristics are a familiar, simple, intuitive, personal, and rewarding design. Collaboration with participants, mutual learning and support are crucial factors when using VTAs, making it possible to include the target group in exploring their digital activities. The VTAs allow the use of conventional data collection methods and access to conversations and insights that cannot be obtained otherwise.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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